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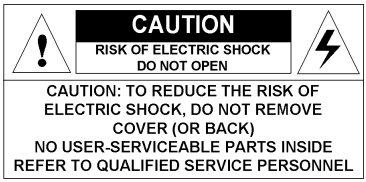
SAFETY INSTRUCTIONS



Regulations

• This apparatus conforms to: CE, UL 950 (EN 60950), C-UL 950, UL 1950, IEC 601-1-2, EN 55022 limit B, EN 50082-1, DHHS (TITLE 21 Subchapter J Part 1020)
• This apparatus is classified as Type B without Applied Part.

Usage in Hazardous locations

• Class I equipment
• Equipment **not** suitable for use in the presence of a **flammable anaesthetic mixture with air** or **with oxygen** or **nitrous oxyde.**

FCC notice

This equipment has been tested and found to comply with the limits of a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Power connection

• Power cord: Utilise a UL-listed detachable power cord, 3-wire, type SJ or equivalent, 18 AWG min., rated 300 V min., provided with a hospital-grade type plug 5-15P configuration for 120V application, or 6-15P for 240V application.

• Read the safety and operating instructions before operating the apparatus.
• Retain safety and operating instructions for future reference.
• Adhere to all warnings on the apparatus and in the operating instructions manual.
• Follow all instructions for operation and use.

• **Warning:** This apparatus must be earthed!
• Power requirements: connect the apparatus to an AC voltage as indicated at its back. Using a lower voltage, the apparatus will not be able to operate. Using a higher voltage may damage the apparatus.
If you are not sure of the type of power supplied, consult the power company.
• Do not overload wall outlets and extension cords as this may result in fire or electric shock.
• Mains lead protection (U.S.: Power cord): Supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs and receptacles.

Water and moisture

• Never expose the apparatus to rain or moisture.
• Never use the apparatus near water - e.g. near a bathtub, washbasin, swimming pool, kitchen sink, laundry tub or in a wet basement.

Ventilation

• Do not cover or block the ventilation openings in the cover of the set. When installing the apparatus in a cupboard or another closed location, heed the necessary space between the set and the sides of the cupboard.

Installation

• Place the apparatus on a flat, solid and stable surface that can bear the weight of at least 3 monitors. If you use an unstable cart or stand, the set may fall, causing serious injury to a child or adult, and serious damage to the equipment.
More warnings in the Installation chapter.

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1. INTRODUCTION

1.1 Overview

Resolution and bandwidths

The BARCO MWD 421 is a high-resolution color display. Its outstanding visual performance, combining a 2 MegaPixel resolution with a high brightness, makes it ideal for diagnostic imaging and many other medical applications.

The MWD 421 is compatible with any AC power system worldwide and automatically synchronizes to a wide range of sync frequencies. Its high-speed video amplifier supports pixel clocks up to 250 MHz.

The memory system

The internal memory system can contain the adjustments for 16 different scanning formats, the so-called scanning modes. Five of them are adjusted and stored in the factory. Each scanning format is characterized by its sync signals. The display's internal micro controller continuously samples the connected sync signals and compares them to the scanning modes already stored in the memory. If the connected signal has already been stored, the micro controller adapts the image to the corresponding adjustment values in the memory, and further adjustments are unnecessary.

If the connected signal is not stored, the display picks the settings from the stored scanning mode that best matches the connected signal. The display should then be adjusted (reserved for qualified staff) and stored.

Image conformity and consistency

Image conformity and consistency are the keywords. In our factory, the MWD 421 displays are perfectly adjusted and calibrated before they are shipped to the customer. Internal circuits ensure display consistency over time.

Conformity with the original image quality is guaranteed by the automatic calibration, which can be done by means of an optical sensor, connected to the Sensor plug on the display. The sensor is not supplied with the display.

Calibration and adjustments

The conformity calibration, as well as the complete adjustment of the display, can be performed by means of the remote, user-friendly MediCal® software package. MediCal, which runs under Microsoft Windows NT, is especially developed to adjust and check BARCO's medical displays. MediCal can be ordered separately.

A lot of adjustments can also be done on the display itself, by means of an extensive on-screen menu system, accessible by using the control knob at the front.

Remote control protocols

The PC on which the remote control software runs, can communicate with the MWD 421 through 2 possible interfaces: RS-232 and USB.

For USB, the MWD 421 provides a hub function. This means that the user can connect peripheral USB devices, such as a keyboard or mouse, to the display's USB down ports.

Power saving system

The MWD 421 is equipped with a power saving system.
When left idle for a certain time, the computer, connected to the display, will power down the display in several steps. The power saving system can be switched on or off during the installation or adjustment of the display.
This system requires a computer imaging board that supports power saving management.

1.2 About the manuals

This guide is meant for people who want to install and use the MWD 421 display, as well as people who need to install and adjust the display. The chapter "Advanced Adjustments" is meant for trained engineers only, because it describes actions and procedures that require a technical skill to be performed properly.

The use of the software MediCal is described in the MediCal User's Manual.

2. INSTALLATION

2.1 Precautions

- Keep your original packaging. It is designed for this display and is the ideal protection during transport.
- Do not lift the display all by yourself to avoid injury.
- Avoid reflections in the picture tube to reduce eye strain.
- Place the display on a strong and stable table or desk if used as desktop display.
- Keep the display away from heat sources and provide enough ventilation in case it is built in a rack or console.
- Keep the display away from strong sources of magnetic fields.
- Make sure the display and computer are both switched off before connecting the signals.

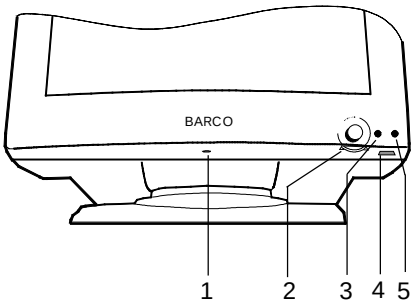
2.2 The package contents

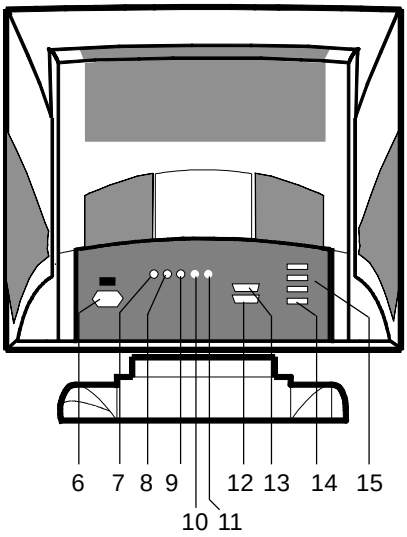
- The MWD 421 display
- The accessory box (in which you found this manual)

Note:

- The black plastic shield (ambient light shield) inside the accessory box is meant to be used during conformity calibration with an X-Rite DTP92 optical sensor.

2.3 Controls and connectors





{1} Connector for optical sensor (RS232 format).

{2} Control knob, consisting of a push button (at the front) and a turning wheel (under the bezel). The control knob is used for switching the power on/off, and selecting and performing functions in the OSD (on-screen display) menu.

{3} Power indicator

{4} USB downstream port

{5} Ambient Light Compensation (ALC) sensor

{6} AC power input. Accepts a voltage from 90 Vac to 264 Vac (automatic).

{7} Input for R video signal

{8} Input for G video signal

{9} Input for B video signal

{10} Input for Horizontal or Composite sync signal

{11} Input for Vertical sync signal

{12} Output of serial data (RS232 format)

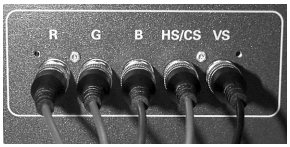
{13} Input for serial data (RS232 format)

{14} USB upstream port (1)

{15} USB downstream ports (3)

2.4 Signal connection

a) Connection of video signals



Connection of RGB with separate sync signals

The connected equipment must comply to all relevant safety demands.

Important: The use of low-quality video cables can distort the video signal and influence diagnosis.

Connect the video output of the computer's imaging board to the **video and sync inputs** on the display's rear panel. Use a proper video cable. The video cable is not supplied with the display.

The inputs accept the following signals:

- Video (RGB) with separate horizontal and vertical sync.
  - The video cable has 5 wires.
  - Connect the red video signal to the connector R **{7}**, green to G **{8}**, and blue to B **{9}**.
  - Connect the horizontal sync signal to the connector HS/CS **{10}**.
  - Connect the vertical sync signal to the connector VS **{11}**.
- Video (RGB) with external composite sync.
  - The video cable has 4 wires.
  - Connect the red video signal to the connector R **{7}**, green to G **{8}**, and blue to B **{9}**.
  - Connect the composite sync signal to the connector HS/CS **{10}**.
- Video (RGB) with internal composite sync (sync on video).
  - The video cable has 3 wires.
  - Connect the red video signal to the connector R **{7}**, green to G **{8}**, and blue to B **{9}**.

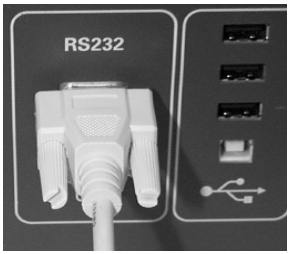
Notes:

- The video inputs cannot be connected in loop-through (daisy-chain).
- The required video amplitude: 700 mV ± 3 dB.
- The required sync. amplitude: 0.3 - 4 Vpp.

b) Connection of data signals

The display can be controlled remotely by a computer through the serial data bus. A typical example of this, is the **MediCal** software that controls the display. MediCal runs on a PC that is connected through the serial data bus. This PC is not necessarily the same computer as the one that produces the video signals.

Unlike the video signals, it is possible to daisy-chain the serial data bus. This means you can control different displays from one PC.



RS-232 connection of 1 display

On RS-232

1. Connect one end of the serial data cable to one of the PC's **COM ports**. If the COM port has a 25-pin connector, you will need to use a **D25-to-D9 interface connector**. The cable and the interface connector are both supplied with **MediCal**.
2. Connect the other end of the serial data cable to the **Remote In** connector **{13}** on the display's rear panel.
3. For a daisy-chain application, connect the **Remote Out** connector **{12}** of the first display to the **Remote In** connector **{13}** of the next display using a straight D9-D9 cable.

USB cable connected to the upstream port

On USB

1 Plug one end of the USB cable into a USB port of the connected computer.

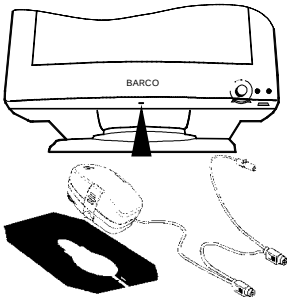
2 Plug the other end of the USB cable into the USB upstream port **{14}** of the display.

3 In case of loop-through connection, plug one end of a second USB cable into one of the USB downstream ports **{15}** of the display. Plug the other end into the upstream port **{14}** of the next display.

4 The other USB downstream ports of the monitor **{15}** can be used for the connection of peripheral equipment, like a mouse, keyboard, scanner, etc.

Note: Do not connect both RS-232 and USB to prevent conflicts.

c) Connection of optical sensor



Connection of an RS-232 sensor

To calibrate the display, you need to connect an optical sensor.

RS-232 sensor: Connect the sensor to the **Sensor** connector **{1}** at the front.

USB sensor: Connect the sensor to the **USB downstream** connector **{4}** at the front.

Notes:

- The display supports the DTP 92 from X-Rite as optical sensor.
- The optical sensor is not supplied by BARCO.
- **Always use the Ambient Light Shield during calibration**.

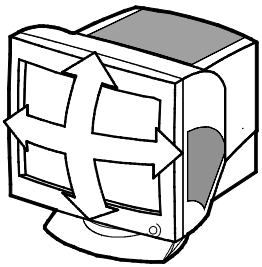
d) Connection of power

Power cord connected to Line input

1. Power cord: Utilize a UL-listed detachable power cord, 3-wire, type SJ or equivalent, 18 AWG min., rated 300 V min., provided with a hospital-grade type plug 5-15P configuration for 120V application, or 6-15P for 240V application.
2. Plug one end of the power cord into the rear of the display (connector LINE **{6}**). Plug the other end into a **grounded** AC power outlet. The display automatically adapts to the voltage. The voltage range is: 90 - 264 VAC.

Note: The display starts after connecting power.

2.5 Positioning the display



The tilt and swivel base allows you to adjust the height and viewing angle of the display to obtain an optimal viewing comfort.

Important considerations

- The best environment for diagnostic imaging is one with controlled and dimmed ambient light. The human eye's sensitivity depends on the ambient light strength. It is most sensitive to small contrast changes (or subtle image details) at limited ambient light levels.
- The best ambient light level, expressed in Lux, depends on the application. An office illumination typically requires 500 Lux. A dimmed environment, like a softcopy room, requires less than 100 Lux.
- Using your display in a controlled and dimmed environment also extends its lifetime, because the display can operate at limited brightness and contrast. These levels correspond to the calibrated position in most cases.
- A controlled ambient light environment implies the ambient light is as constant as possible. Cover windows to keep out the daylight. Avoid switching the lights and viewing boxes on and off. A consistent environment results in more image consistency and less eye fatigue.
- Avoid reflections in the picture tube. Provide indirect lighting. Don't place the displays in front of or close to a light source like a window or viewing box, although this may be very tempting. As a rule of thumb, keep viewing boxes at least one metre (3 feet) away from the displays.

3. OPERATION: USER CONTROLS

Important:

The best way to adjust and control the display is by using MediCal, which displays the ideal test patterns for correct adjustment. However, in case you do not dispose of MediCal, you can control and adjust the display by means of the built-in On-Screen Display (OSD).

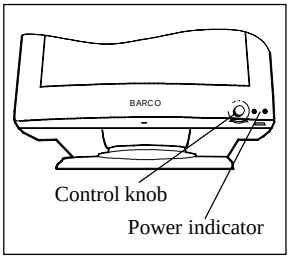
3.1 Switching on / off

Power on/off

The display is disconnected from power only when the power cord is unplugged from the power input **{6}**.

Once the power is connected to the power input **{6}**, the display starts.

Manual stand-by



To put the display in manual stand-by mode, press the control knob **{2}** shortly. As a result, the power indicator **{3}** turns orange.

Note: You cannot switch the display in manual stand-by when the on-screen display (OSD) is visible. In that case, first exit the OSD, and then press the control knob to switch to stand-by mode.

To activate the display from stand-by mode, press the control knob **{2}** again. As a result, the power indicator **{3}** turns green again.

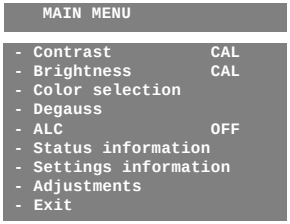
3.2 Contrast and brightness control

Contrast and brightness can be controlled through the OSD menus.

To activate the OSD

Turn the turning wheel (under the bezel) from left to right or from right to left. As a result, the OSD main menu appears.

Note: The wheel should turn over at least 30 degrees before the OSD becomes visible.



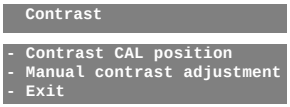
The OSD main menu

The main menu indicates the current setting for contrast and brightness.

This can be:

- CAL: The calibrated position. This is the preferred setting in a controlled environment.
- ALC: For contrast only. This indicates the Ambient Light Compensation (ALC) is on, and contrast is controlled automatically, depending on the ambient light. In that case you cannot control contrast as long as ALC is switched on.
- <empty>:
  When the main menu does not specify a setting, contrast or brightness is manually set to a different value than the calibrated position.
  For contrast only, this can also mean the Booster system is on. If so, this is indicated in the OSD when you select the Contrast control. When the Booster system is on, you cannot control contrast.

To put contrast in calibrated position



Contrast control menu

1. Turn the wheel under the bezel to select **Contrast** in the OSD main menu.
2. Press the control knob shortly. The contrast control menu appears.
3. In the contrast control menu, select **Contrast CAL position** and press the control knob shortly.

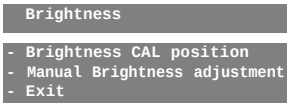
To control contrast manually

Contrast scroll bar. The short stroke in the bar indicates the calibrated position, the long stroke indicates the current setting.

1. Turn the wheel under the bezel to select **Contrast** in the OSD main menu.
2. Press the control knob shortly. The contrast control menu appears.
3. In the contrast control menu, select **Manual contrast adjustment** and press the control knob shortly. The contrast scroll bar appears.
4. Turn the wheel under the bezel until you have reached the desired contrast.
5. Press the control knob shortly or wait a few seconds to return to the contrast control menu.

6 In the contrast control menu, select **Exit** and press the control knob shortly to return to the main menu. Alternatively, you can just wait a few seconds, and the OSD returns to the previous menu automatically.

To put brightness in calibrated position



Brightness control menu

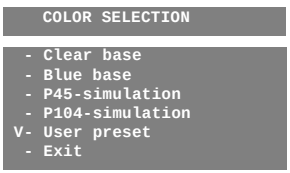
1 Turn the wheel under the bezel to select **Brightness** in the OSD main menu.
2 Press the control knob shortly. The brightness control menu appears.
3 In the brightness control menu, select **Brightness CAL position** and press the control knob shortly.

To control brightness manually

Brightness scroll bar. The short stroke in the bar indicates the calibrated position, the long stroke indicates the current setting.

1 Turn the wheel under the bezel to select **Brightness** in the OSD main menu.
2 Press the control knob shortly. The brightness control menu appears.
3 In the brightness control menu, select **Manual brightness adjustment** and press the control knob shortly. The brightness scroll bar appears.
4 Turn the wheel under the bezel until you have reached the desired brightness.
5 Press the control knob shortly or wait a few seconds to return to the brightness control menu.
6 In the brightness control menu, select **Exit** and press the control knob shortly to return to the main menu. Alternatively, you can just wait a few seconds, and the OSD returns to the previous menu automatically.

3.3 Color selection



You can select from five different color presets. Selecting another color preset will change the color temperature of the image, from rather reddish, over neutral, to rather bluish.

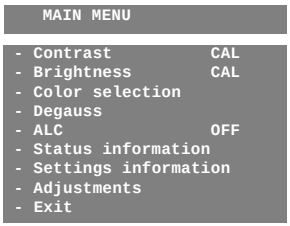
The color preset you select depends on the application the display is used in.

To select a color preset:

1 Turn the wheel under the bezel to select **Color selection** in the OSD main menu.
2 Press the control knob shortly. The list with possible color presets appears. The currently selected color preset is indicated by a checkmark preceding the preset's name.
3 Turn the wheel to select the desired color preset.
4 Press the control knob to activate the color preset.
5 Select **Exit** and press the control knob shortly to return to the main menu. Alternatively, you can just wait a few seconds, and the OSD returns to the previous menu automatically.

Note: Color selection is not possible when the Booster system is on.

3.4 Degauss



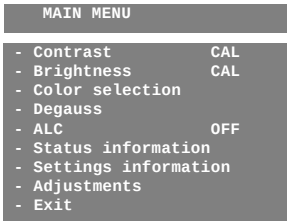
The OSD main menu

To degauss (demagnetize the display):

1 Turn the wheel under the bezel to select **Degauss** in the OSD main menu.
2 Press the control knob shortly to degauss. As a result, the image shivers shortly.

3.5 ALC

With this function, you can switch Ambient Light Compensation (ALC) on or off. The current setting is indicated in the OSD.



The OSD main menu

To change the ALC setting:

1 Turn the wheel under the bezel to select **ALC** in the OSD main menu.
2 Press the control knob shortly to change the setting.

Note: ALC is not possible when the Booster system is on.

3.6 Viewing Status information

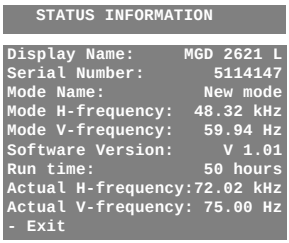
You can view the current status of the display. This cannot be changed.

To view the status information

Turn the wheel under the bezel to select **Status information** in the OSD main menu and press the control knob to enter the selected menu.

The Status information menu appears. The only control in the menu is **Exit**.

Explanation of the Status information menu items



Status information menu

Display Name:	This is the display type.
Serial Number:	This is the display's serial number.
Mode Name:	The currently selected scanning mode. If the connected signal is not yet stored in the memory, the menu displays "New mode".
Mode H-frequency: Mode V-frequency:	These are the horizontal and vertical sync frequencies of the currently selected scanning mode. These are the figures stored in the memory.
Software Version:	The internal software version.
Run time:	The total operating time since production, ond anymore.
Actual H-frequency: Actual V-frequency:	These are the actual horizontal and vertical sync frequencies of the connected video signal. They are measured constantly by the display.

3.7 Viewing Settings information

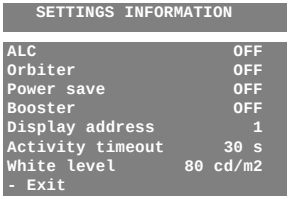
You can view the current status of the display's settings. You cannot change them in this menu. Changing the settings is reserved for trained service staff only.

To view the Settings information

Turn the wheel under the bezel to select **Settings information** in the OSD main menu and press the control knob to enter the selected menu.

The Settings information menu appears. The only control in the menu is **Exit**.

Explanation of the Settings information menu items



The Settings menu

ALC	Short for Ambient Light Compensation. This is a system that, when switched on, controls the display contrast automatically, depending on the ambient light.
Orbiter	This is a system that, when switched on, slowly moves the image to prevent phosphor burn-in.
Power Save	This is the DPMS system that switches down the display automatically after a long period of inactivity. The DPMS system is triggered by the PC graphics board.
Booster	This is a system that, when switched on, boosts the display luminance to obtain the maximum light output.
Display address	This is the display remote address. When several displays are remotely controlled, e.g., by means of the MediCal software, each display must have a unique address.

Activity timeout	This is the time after which the display interrupts data communication with a computer when the computer does not respond anymore. After the timeout has expired, the control of the display is returned to the OSD menu system.
White level	This is the white level, expressed in Cd/m2, the display obtains when displaying a white field in calibrated position.

3.8 Other adjustments

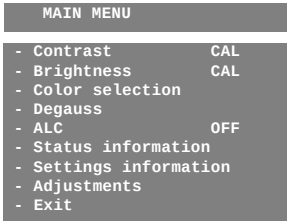
The main menu item **Adjustments** is reserved for trained service staff and is therefore protected by a password.

4. ADVANCED SETTINGS AND ADJUSTMENTS (FOR SERVICE STAFF ONLY)

Important:

The functions and controls described in this chapter can have a serious impact on the performance of the display. They should be touched by trained service staff only!

4.1 Entering the Adjustments menu



The OSD main menu

To enter the menu

1 Turn the wheel under the display bezel from left to right or from right to left to activate the On-Screen Display (OSD) main menu.

2 In the main menu, turn the wheel to select **Adjustments**.

3 Press and hold the control knob **for a few seconds**.
The Adjustments menu appears.
Note: If you press only shortly, the message "Service protected" appears.

4.2 Geometry

a) How to make the adjustments

1 Turn the wheel to select the adjustment you want to make.

2 Press the control knob shortly to display the adjustment scroll bar or menu.

3 Turn the wheel to perform the adjustment.

4 Return to the previous menu by pressing the control knob or selecting **Exit** when present.

b) Description of the adjustments

GEOMETRY

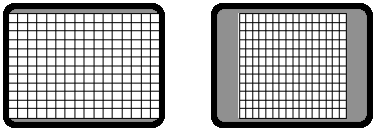
- Auto geometry
- Width
- Horizontal position
- Height
- Vertical position
- Rotation
- Blanking
- Advanced geometry
- Exit

The geometry menu

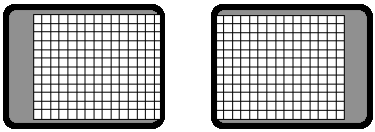
Auto geometry

Automatically adjusts geometry to almost 100% perfect. This adjustment requires an image that covers the full screen, from left to right and from top to bottom. E.g., the desktop pattern of a computer is a good image.

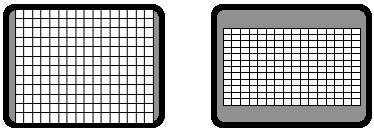
Width



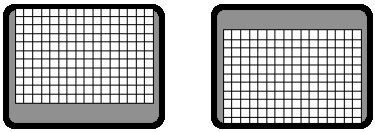
Horizontal position



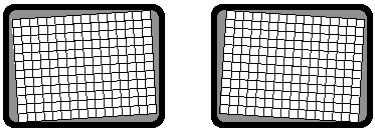
Height



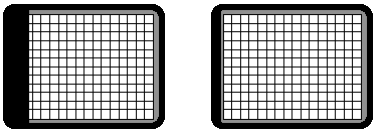
Vertical position



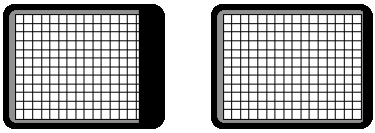
Rotation



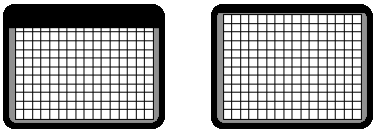
Blanking - Blanking left



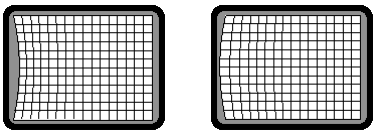
Blanking - Blanking right



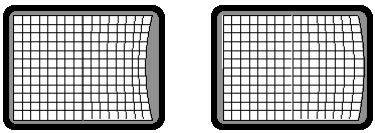
Blanking - Blanking top



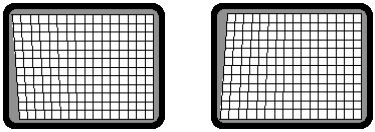
Advanced geometry - Horizontal bowing left



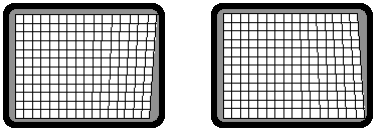
Advanced geometry - Horizontal bowing right



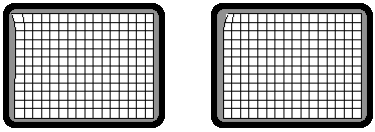
Advanced geometry - Horizontal skewing left



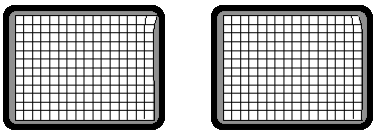
Advanced geometry - Horizontal skewing right



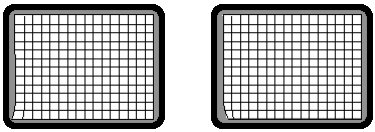
Advanced geometry - Corner top left



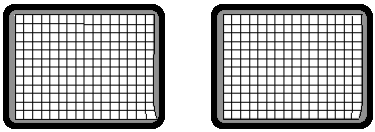
Advanced geometry - Corner top right



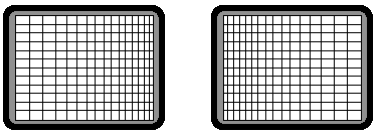
Advanced geometry - Corner bottom left



Advanced geometry - Corner bottom right



Advanced geometry - Horizontal linearity



4.3 Focus

a) How to make the adjustments

1 Turn the wheel to select the adjustment you want to make.

2 Press the control knob shortly to display the adjustment scroll bar or menu.

3 Turn the wheel to perform the adjustment.

4 Return to the previous menu by pressing the control knob or selecting **Exit** when present.

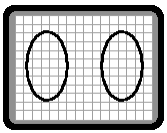
Note: The focus adjustments can best be made on a crosshatch pattern with horizontal and vertical lines.

b) Description of the adjustments

```
   FOCUS
```

```
- Static focus
- Horizontal line focus
- Focus zone
- Exit
```

The focus menu



Zones for static focus

Static focus

Adjust Static focus to obtain horizontal and vertical lines as sharp as possible in the zones indicated in the illustration aside.

Horizontal line focus

Adjust to obtain horizontal lines as sharp as possible in the zones indicated in the illustration aside.

Focus zone

You can adjust the focus in 8 independent zones. Turn the wheel to obtain an image as sharp as possible in the selected zone. Press the control knob to switch to the next zone.

You have to go through all the zones before you can exit this menu. However, you need not make changes to every zone if not necessary.

4.4 ALC

How to make the adjustments

```
   ALC
```

```
- Minimum illuminance
- Maximum illuminance
- Exit
```

The ALC menu

1 Dim the light in the room.
2 Turn the wheel to select **Minimum illuminance**.
3 Press the control knob shortly to display the adjustment scroll bar.
4 Turn the wheel to perform the adjustment. Adjust until you are satisfied with the picture contrast.
5 Return to the ALC menu by pressing the control knob while the light is still dimmed. Upon exiting the adjustment, the display measures the ambient light to determine the first reference point.
6 Create normal ambient light in the room.
7 Turn the wheel to select **Maximum illuminance**.
8 Press the control knob shortly to display the adjustment scroll bar.
9 Turn the wheel to perform the adjustment. Adjust until you are satisfied with the picture contrast.
10 Return to the ALC menu by pressing the control knob while the light intensity is still normal. Upon exiting the adjustment, the display measures the ambient light to determine the second ALC reference point.

4.5 White uniformity

a) How to make the adjustments

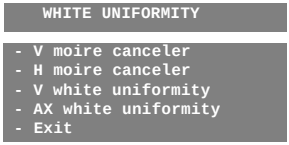
1 Turn the wheel to select the adjustment you want to make.

2 Press the control knob shortly to display the adjustment scroll bar.

3 Turn the wheel to perform the adjustment.

4 Return to the previous menu by pressing the control knob or selecting **Exit** when present.

b) Description of the adjustments



The white uniformity menu

V moire canceler

Increase in small steps if you notice a moire pattern of horizontal lines. Remark: over-adjustment results in degraded image quality.

H moire canceler

Adjust if you notice a moire pattern of vertical and/or diagonal lines. Remark: over-adjustment results in degraded image quality.

V white uniformity

Adjust on a completely white image. Adjust to obtain a uniform white image in the *center* area of the screen. Remark: Adjust **in small steps**. After each step, the image will shiver because of an automatically generated degauss.

H white uniformity

Adjust on a completely white image. Adjust to obtain a uniform white image in the remaining area of the screen. Adjust slowly.

4.6 Color calibration

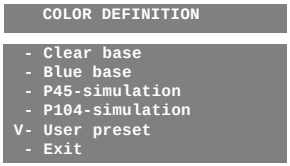
To calibrate the display, proceed as follows:

1 Connect the Optisense and apply the black shield to the sensor (see chapter "Installation").

2 Select the **Color calibration** menu.

3 Follow the instructions on the screen.

4.7 Color definition



The color definition menu

With this menu you can define or change the color temperature of the 5 color presets. You can define the color temperature in Kelvin or (x,y) chromaticity coordinates.

To define a color preset, proceed as follows:

1 Turn the wheel under the bezel to select the color preset you want to define.

2 Press the control knob to activate the preset and enter its color definition menu.

3 Turn the wheel to select the parameter you want to change: x, y, or K (Kelvin).

4 Press the control knob. The corresponding scroll bar appears.

5 Turn the wheel to change the selected parameter.

6 Press the control knob to return to the color definition menu. The modified preset is preceded by a check mark in the menu.

4.8 Other settings

a) To change the settings

1 Turn the wheel to select the setting you want to change.

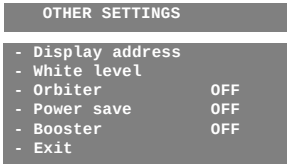
5 Press the control knob shortly to change the selected setting (on or off).

6 For **Display address** and **White level**, you can change the setting by turning the wheel. Return to the Other settings menu by pressing the control knob.
For the other settings, the new status instantly appears in the other settings menu.

b) Explanation of the Other settings menu items

Display address

In multi-head systems (multiple displays controlled by one system), each display must have a different address. With this setting you can set the display address from 1 to 16.



The other settings menu

White level

This is the light output of the display when displaying a white field in calibrated position. The white level is expressed in Cd/m², and can be set from 60 to 90 Cd/m².

Orbiter

The Orbiter is an internal circuit that, when switched on, will slightly and slowly move the image to prevent phosphor burn-in.

Power save

This setting can switch the automatic power saving system (see Introduction chapter) on or off.

Booster

This is a system that, when switched on, boosts the display luminance to obtain the maximum light output.

When the booster system is on, contrast control, color selection and ALC are not possible in the main menu.

4.9 Erase user settings

With this function you can erase ALL user-defined settings (from the user scanning modes) from the display memory. The factory-defined settings will not be erased. As a consequence, erasing the user settings restores the memory as if the display has just left the factory.

To erase the user settings:

1 Turn the wheel under the bezel to select **Erase user settings**.

2 Press the control knob.
A warning message appears, reminding you that ALL user settings will be deleted.

3 Turn the wheel to select **Go ahead** (text will be highlighted by a red bar).

4 Press the control knob.

The display will now erase all user settings and return to the Adjustments menu.

4.10 How to save changes

Proceed as follows:

1 After having made the adjustments, select **Exit** in each appearing menu until the **Save Changes?** message appears.

2 Select **Yes** to save the changes.
Select **No** to exit the OSD menus without saving any of the changes you have made.

Note: Any changes in the **Other settings** menu are saved automatically.

What happens upon saving?

- When the current scanning mode was already stored in the display memory, the scanning mode is updated with the new adjustment values.
- When the scanning mode was not yet stored in the memory, the display will create a new scanning mode in the memory.
  However, when the memory was full, the monitor will display a list of scanning modes in the memory and ask if you wish to overwrite one of them. If you want to store the adjustments you have made, you will have to overwrite one of the scanning modes in memory.
  Note: The factory-aligned scanning modes, also appearing in the list, cannot be overwritten.

5. MAINTENANCE

Picture tube

The glass panel of the picture tube is handled with a special coating. Take care not to damage or scratch the coating.

Clean the picture tube with a soft woolen or cotton cloth.

The cloth should be moist, not wet!

Use a watery solution or a mild commercial glass cleaning solution.

Apply (e.g., spray) the solution on the cloth, not on the picture tube.

Cabinet

Clean the cabinet using a recognized cleaning product for medical equipment. The cloth you use must be moist, not wet!

The cabinet has been tested for resistance to the following products: Cidex, Betadine, Alcohol (Isopropyl and Ethyl), Ammonia-based cleaners (Windex) and Aquasonic Gel.

6. TROUBLESHOOTING

There appears no image on the picture tube, the green LED on the front is out

- Check if the power cord is properly connected to the power outlet and to the display.
- Check if contrast and brightness are not set to 0.

There appears no image on the picture tube, the orange LED is on

The display is switched in Stand-by, manually or by the automatic Power saving system.

- Press the control knob at the front shortly.
- Try to get the display active again by pressing any key on the keyboard of the computer that produces the video and sync. signals for the display.
- Check if both horizontal and vertical sync. signals are connected to the display and to the computer.

On the picture tube appears the message "No Valid Sync Signal"

- Check if both horizontal and vertical sync. signals are connected to the display and to the computer.
- Check if the sync. signals are connected in the proper way (refer to the chapter "Installation").
- Check if both horizontal and vertical sync. frequencies match the display specifications (refer to the chapter "Technical specifications").

For other problems, please consult your technical service department.

APPENDIX A: BACKGROUND INFORMATION

Power saving system

The display is equipped with circuits that can handle power saving management. When the system is switched on, it can power down the display in several steps.

The system is controlled by the imaging board or the PC that delivers the video signals. When you are working on the computer, the imaging board delivers both sync signals, and the display is operating normally. When you don't touch the computer keyboard for a certain time, the imaging board only delivers vertical sync. This is sensed by the display's micro controller, that blanks the image on the CRT. This results in a drop of power consumption with about 25 %.

When you leave the computer idle for a longer period, the imaging board now delivers horizontal sync only. As a result, the display's micro controller switches off a number of internal circuits. The power consumption has now dropped with about 80 %.

At last, the imaging board delivers no sync signals at all, and the micro-controller switches off all but one power supplies in the display. Only the micro-controller's own supply keeps on running, resulting in a very low power consumption of 6 W.

If you start using the computer again, the imaging board switches on both sync signals, and the micro-controller switches on the display in about 3 seconds.

The times after which the different steps of power management must become active, is set in the PC's display properties.

APPENDIX B:
TECHNICAL SPECIFICATIONS

Picture tube:
Dot pitch: 0.26 mm
Faceplate transmission: 40 - 58 %
Faceplate type: AR panel
Image representation: landscape

Light output:
Calibrated: 80 CD/m2
Peak: 150 Cd/m2 (small area)

Resolution:
Max. adress. pixels: 1844
Max. adress. lines: 1300

Scanning systems
Horizontal scanning:
Multi sync: µ-controller controlled
Minimum frequency: 30 kHz
Maximum frequency: 106 kHz
Minimum blanking : 2 µs
Storable scan frequencies: 16
Prealigned scans: 5
Vertical scanning:
Minimum frequency: 45 Hz
Maximum frequency: 160 Hz
Minimum blanking: 340 µs (after leading edge)

Geometry
Nominal size (4/3 ratio): 392mm x 294mm
Nominal size (5/4 ratio): 368mm x 294mm

Inputs
Video
BNC connectors
Nominal level: 0.7 Vpp
Sync
BNC connectors
Nominal level: 0.3 - 4 Vpp
Communication inputs/outputs
RS232 9-pin sub D connector
Baudrate: 9600
USB: 1 up port, 4 down ports

Power supply:
Voltage: 90 - 265 V
Frequency: 48 - 66 Hz
Inrush current: < 25 Ap-z

Environmental
Temperature range (°C):

Storage:	-20/+65
Operation:	0/+45
Within specs:	15/+30

Altitude:

storage:	25 000 ft
operational:	10 000 ft

Humidity (relative):
95 % max., non condensing

Weight:

Unpacked	Packed
32 kg	42 kg

Dimensions packing (mm):
H x W x D: 740 * 620 * 580

Dimensions monitor (mm):

Height:	502 with tilt&swivel
	438 without tilt&swivel
Width:	500
Depth:	501

Modifications reserved.